

File Revision Date:

May 25, 2021

Data Set Description:

PI: James W. Hannigan

Instrument: Bruker 125HR Fourier Transform Interferometer

Site(s): South Mountain, Thule, Greenland 76.52N, 68.77W,  
225masl

Measurement Quantities:

Column Density [molec/cm<sup>2</sup>] N<sub>2</sub>O, O<sub>3</sub>, HCl, HF, HNO<sub>3</sub>, CO, CLONO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>O, HCN, C<sub>2</sub>H<sub>6</sub>

Volume mixing ratios [vmr] N<sub>2</sub>O, O<sub>3</sub>, HCl, HF, HNO<sub>3</sub>, CO, CH<sub>4</sub>, H<sub>2</sub>O, HCN, C<sub>2</sub>H<sub>6</sub>

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Reference Articles:

"Network for the Detection of Stratospheric Change Fourier transform infrared intercomparison at Table Mountain Facility, November 1996", A. Goldman et.al., J. Geophys. Res., Vol. 104, No. D23, pp30481-30503, 20 Dec 1999

"Semiautonomous FTS Observation System for Remote Sensing of Stratospheric and Tropospheric Gases." J. W. Hannigan, M. T. Coffey, and A. Goldman. Journal of Atmospheric and Oceanic Technology, 26:1814-1828, March 2009. doi: 10.1175/2009JTECHA1230.1.

Instrument Description:

This meta-data file describes data taken at South Mountain 225masl at Thule Air Base, Greenland. The instrument has been blind intercompared as per the NDSC requisite. The instrument, intercomparison, data, analysis and errors are described in the reference given above. The instrument runs autonomously via computer control. Observations are programmed to be take daily weather permitting. The instrument measures solar absorption spectra from 750cm<sup>-1</sup> to 5000cm<sup>-1</sup> in seven filter bands. A single spectra is the average of at least one forward and one backward scan which can be taken in under 3 minutes. Spectra are ftp'd back to NCAR via an internet connection daily for analysis. The data in the archive are individual spectra not averages. As of November 2014 all data in the NDACC archive has been reprocessed with the latest versions of SFIT4 to the current NDACC/IRWG standard retrieval guidelines (<https://www2.aom.ucar.edu/irwg>).

Algorithm Description:

As of November 2014 all data in the NDACC archive has been reprocessed with the latest versions of SFIT4 to the current NDACC/IRWG standard retrieval guidelines (<https://www2.aom.ucar.edu/irwg>). This includes HITRAN 2008 plus updates, NCEP temperatures and pressures as distributed by NDACC, a priori profiles from the IRWG\_V6 of WACCM. This version of SFIT4 includes uncertainty estimates based on modeled sensitivities calculated in the retrieval model for many retrieved, forward model and instrumental parameters. These

uncertainty estimates are included in the HDF archived data files along with the best estimate of the water vapor profile at the time of the measurement, the mixing ratio profile and the air mass profile.

Expected Precision/Accuracy of Instrument:

A complete discussion of the errors in the columns can be found in the error analysis section of the JGR paper. Current best estimates are given in the HDF files and are calculated for each retrieved profile.

Instrument History:

See Reference above. The instrument was moved from its initial building approximately 1 km away into a new building in 2011. Here it was positioned on a platform to reduce to the solar tracker to instrument distance. ILS measurements were done before and after that show the realignment process was successful. The first solar spectra taken in the new building was 11 Sep 2011. Degradation of the beamsplitter and electrical filters occurred in 2014. The instrument was replaced in May 2015 with a Bruker 125HR. At the same time the solar trackers were replaced by a single camera feedback system. The HR is now back mounted on the floor. The instrument is not evacuated.